



Testing Laboratory
3787

RADIO EXPOSURE TEST REPORT

FCC ID : 2AXXQBGW321

Equipment : BGW320-500 Wireless Integrated ONT Residential Gateway

Brand Name : HUMAX

Model Name : BGW320-500

Applicant : HUMAX Networks, INC
HUMAX Village, 216, Hwangsaeul-ro, Bundang-gu,
Seongnam city, Gyeonggi-do South Korea 13595

Manufacturer : HUMAX Networks, INC
HUMAX Village, 216, Hwangsaeul-ro, Bundang-gu,
Seongnam city, Gyeonggi-do South Korea 13595

Standard : 47 CFR Part 2.1091

The product was received on Sep. 12, 2024, and testing was started from Sep. 13, 2024 and completed on Oct. 24, 2024. We, Sporton International Inc. Hsinchu Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in 47 CFR Part 2.1091 and shown compliance with the applicable technical standards.

The test results in this variant report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. Hsinchu Laboratory, the test report shall not be reproduced except in full.

Approved by: Sam Chen

Sporton International Inc. Hsinchu Laboratory

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Photographs of EUT v01



History of this test report

TEL : 886-3-656-9065
FAX : 886-3-656-9085
Report Template No.: CB-A1_1 Ver1.1

Page Number : 3 of 11
Issued Date : Nov. 13, 2024
Report Version : 01



Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
2	-	Exposure evaluation	PASS	-

Conformity Assessment Condition:

1. The test results (PASS/FAIL) with all measurement uncertainty excluded are presented against the regulation limits or in accordance with the requirements stipulated by the applicant/manufacture who shall bear all the risks of non-compliance that may potentially occur if measurement uncertainty is taken into account.
2. The measurement uncertainty please refer to each test result in the chapter "Measurement Uncertainty".

Disclaimer:

The product specifications of the EUT presented in the test report that may affect the test assessments are declared by the manufacturer who shall take full responsibility for the authenticity.

Reviewed by: **Sam Chen**

Report Producer: **Sophia Shiung**



1 General Description

1.1 EUT General Information

RF General Information			
Evaluation Mode	Frequency Range (MHz)	Operating Frequency (MHz)	Modulation Type
2.4GHz WLAN	2400-2483.5	2412-2462	802.11b: DSSS (DBPSK, DQPSK, CCK) 802.11g/n: OFDM (BPSK, QPSK, 16QAM, 64QAM) VHT: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM) 802.11ax: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM)
5GHz WLAN	5150-5250 5250-5350 5470-5725 5725-5850	5180-5250 5250-5320 5500-5720 5745-5825	802.11a/n: OFDM (BPSK, QPSK, 16QAM, 64QAM) 802.11ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM) 802.11ax: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM)



1.2 Antenna Information

Ant.	Port		Brand	Model Name	Antenna Type	Connector	Gain (dBi)
	WLAN 2.4GHz	WLAN 5GHz					
1	1	1	GALTRONICS	02102140-06811U1	PCB	I-PEX	Note 1
2	2	2	GALTRONICS	02102140-06811U1	PCB	I-PEX	
3	3	3	GALTRONICS	02102140-06811U1	PCB	I-PEX	
4	4	4	GALTRONICS	02102140-06811U1	PCB	I-PEX	
5	-	4	GALTRONICS	02102140-06811U1	PCB	I-PEX	
6	-	3	GALTRONICS	02102140-06811U1	PCB	I-PEX	
7	-	2	GALTRONICS	02102140-06811U1	PCB	I-PEX	
8	-	1	GALTRONICS	02102140-06811U1	PCB	I-PEX	
9	-	-	GALTRONICS	02102140-06811U1	PCB	I-PEX	5.50

Note1:

Ant.	Antenna Gain (dBi)				
	WLAN 2.4GHz	WLAN 5GHz			
		UNII 1	UNII 2A	UNII 2C	UNII 3
1	4.3	2.43	2.5	-	-
2	3.63	2.08	2.97	-	-
3	2.69	2.93	2.8	-	-
4	4.67	3.28	3.24	-	-
5	-	-	-	2.57	2.64
6	-	-	-	3.98	4.12
7	-	-	-	2.29	2.9
8	-	-	-	3.18	4.21

Item	Directional Gain (dBi)				
	WLAN 2.4GHz	WLAN 5GHz			
		UNII 1	UNII 2A	UNII 2C	UNII 3
4T1S	5.99	4.45	4.07	4.11	4.43
4T2S	4.67	3.28	3.24	3.98	4.21
4T4S	4.67	3.28	3.24	3.98	4.21

Note 2: The above information (excepting antenna gain and directional gain) was declared by manufacturer.

Note 3: The Ant. 9 which has the receiving function only is for zero wait use.

Note 4: The antenna gain and directional gain are measured which follow the procedure of KDB 662911 D03

Note 5: **For 2.4GHz function:****For IEEE 802.11b/g/n/VHT/ax (4TX/4RX):**

Port 1~4 can be used as transmitting/receiving antenna.

Port 1~4 could transmit/receive simultaneously.

For 5GHz function:**For IEEE 802.11a/n/ac/ax (4TX/4RX):**

Port 1~4 can be used as transmitting/receiving antenna.

Port 1~4 could transmit/receive simultaneously.

For 1RX:

Ant. 9 can be used as receiving antenna only.



1.3 Table for Permissive Change

This product is an extension of original one reported under Sporton project number: FA242501-01.

Below is the table for the change of the product with respect to the original one.

Modifications	Performance Checking
1. Change the resource of FEM to "Brand: Qorvo / Model: QPF7219" from "Brand: SKYWORKS / Model: SKY85336" for 2.4GHz. 2. Change the resource of FEM to "Brand: Qorvo / Model: QPF4516B" from "Brand: SKYWORKS / Model: SKY85787" for 5GHz. 3. Change the resource of filter to "Brand: JIAKANG / Model: DFC0304R5235P180" from "Brand: SOSHIN / Model: HMD0108N" for 5GHz low band. 4. Change the resource of the accessory adapter to "Brand: AT&T / Model: EPS48R1-36" from "Brand: DIRECTV / Model: EPS48R1-16". 5. Change the heatsink to stamping type from extrusion type. 6. Change the FW to "100.00.01_1725585160" from "3.17.1_1.6_UNSECURE_IMPL87_HUMA". 7. Remove the gasket of RF chip. 8. Change the source of memory to "Brand: Micron / Model: MT41K256M16TW-093".	RF Exposure.
9. Change the applicant's information to "Company name: HUMAX Networks, INC / Address: HUMAX Village, 216, Hwangsaеul-ro, Bundang-gu, Seongnam city, Gyeonggi-do South Korea 13595" from "Company name: Humax Networks, INC. / Address: 216, Hwangsaеul-ro, Bundang-gu, Seongnam-si, 463-875, South Korea".	After evaluation, it does not need to re-test.

1.4 Accessories

Equipment Name	Brand Name	Model Name	Rating
Adapter	AT&T	EPS48R1-36	INPUT: 120 V~1.1 A, 60Hz OUTPUT: 12V, 4A, 48W



1.5 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ♦ 47 CFR Part 2.1091
- ♦ KDB 447498 D04 Interim General RF Exposure Guidance v01

The following reference test guidance is not within the scope of accreditation of TAF.

- ♦ 47 CFR Part 1.1307
- ♦ 47 CFR Part 1.1310

1.6 Testing Location

Testing Location Information	
Test Lab. : Sporton International Inc. Hsinchu Laboratory	
Hsinchu	ADD: No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County 302010, Taiwan (R.O.C.)
(TAF: 3787)	TEL: 886-3-656-9065 FAX: 886-3-656-9085
	Test site Designation No. TW3787 with FCC.
	Conformity Assessment Body Identifier (CABID) TW3787 with ISED.



2 Maximum Permissible Exposure

2.1 Limit of Maximum Permissible Exposure

(A) Limits for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-3.0	614	1.63	*(100)	<6
3.0-30	1842/f	4.89/f	*(900/f ²)	<6
30-300	61.4	0.163	1.0	<6
300-1500	-	-	f/300	<6
1500-100,000	-	-	5	<6

(B) Limits for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-1.34	614	1.63	*(100)	<30
1.34-30	824/f	2.19/f	*(180/f ²)	<30
30-300	27.5	0.073	0.2	<30
300-1500	-	-	f/1500	<30
1500-100,000	-	-	1.0	<30

Note: f = frequency in MHz ; *Plane-wave equivalent power density

2.2 MPE Calculation Method

The MPE was calculated at 58 cm to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

$$E \text{ (V/m)} = \frac{\sqrt{30 \times P \times G}}{d}$$

$$\text{Power Density: } Pd \text{ (W/m}^2\text{)} = \frac{E^2}{377}$$

E = Electric field (V/m)

P = RF output power (W)

G = EUT Antenna numeric gain (numeric)

d = Separation distance between radiator and human body (m)

The formula can be changed to

$$Pd = \frac{30 \times P \times G}{377 \times d^2}$$



2.3 MPE Exemption

Option (A): 1.1307(b)(3)(i)(A): Available maximum time-averaged power is < 1 mW

Option (B): 1.1307(b)(3)(i)(B): Device operates between 300 MHz and 6 GHz and the maximum time-averaged power or effective radiated power (ERP), whichever is greater, <= Pth.

$$P_{th} \text{ (mW)} = \begin{cases} ERP_{20 \text{ cm}} (d/20 \text{ cm})^x & d \leq 20 \text{ cm} \\ ERP_{20 \text{ cm}} & 20 \text{ cm} < d \leq 40 \text{ cm} \end{cases}$$

Where

$$x = -\log_{10} \left(\frac{60}{ERP_{20 \text{ cm}} \sqrt{f}} \right) \text{ and } f \text{ is in GHz;}$$

and

$$ERP_{20 \text{ cm}} \text{ (mW)} = \begin{cases} 2040f & 0.3 \text{ GHz} \leq f < 1.5 \text{ GHz} \\ 3060 & 1.5 \text{ GHz} \leq f \leq 6 \text{ GHz} \end{cases}$$

d = the separation distance (cm);

Option (C): 1.1307(b)(3)(i)(C): ERP is below a threshold calculated based on the distance

R between the person and the antenna / radiating structure, where $R > \lambda / 2 \pi$.

Single RF Sources Subject to Routine Environmental Evaluation	
RF Source frequency (MHz)	Threshold ERP (watts)
0.3-1.34	$1,920 R^2$.
1.34-30	$3,450 R^2/f^2$.
30-300	$3.83 R^2$.
300-1,500	$0.0128 R^2 f$.
1,500-100,000	$19.2 R^2$.
Note: R is in meters, f is in MHz.	



2.4 Calculated Result and Limit

Exposure Environment: General Population / Uncontrolled Exposure

Mode	DG (dBi)	Power (dBm)	ERP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
2.4G;D1D	5.99	29.97	33.81	0.03	2421.029	58	C	6458.9	0.3750
5.2G;D1D	4.45	29.86	32.16	0.50	1845.015	58	C	6458.9	0.2858
5.3G;D1D	4.07	23.92	25.84	0.50	430.527	58	C	6458.9	0.0667
5.6G;D1D	4.11	23.88	25.84	0.50	430.527	58	C	6458.9	0.0667
5.8G;D1D	4.43	29.97	32.25	0.50	1883.649	58	C	6458.9	0.2917

Simultaneous Transmission Analysis Mode:

WLAN 2.4GHz + WLAN 5GHz (Low band) + WLAN 5GHz (High band)

Mode	DG (dBi)	Power (dBm)	ERP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
5.2G;D1D	4.45	29.86	32.16	0.50	1845.015	58	C	6458.9	0.2858
5.8G;D1D	4.43	29.97	32.25	0.50	1883.649	58	C	6458.9	0.2917
2.4G;D1D	5.99	29.97	33.81	0.03	2421.029	58	C	6458.9	0.3750
Sum TL Ratio_C	0.9525								
Ratio Limit	1								

————THE END————